CLAIMS

What is claimed is:

1. An alloy comprising, in weight percent based on total alloy weight:

at least 20 cobalt;

32.7 to 37.3 nickel;

18.75 to 21.25 chromium;

8.85 to 10.65 molybdenum; and

less than 30 ppm nitrogen.

2. The alloy of claim 1, comprising less than 20 ppm nitrogen.

3. The alloy of claim 1, further comprising less than 0.7 weight percent titanium.

4. The alloy of claim 1, further comprising less than 0.03 weight percent titanium.

5. The alloy of claim 1, further comprising:

no greater than 0.035 carbon;

no greater than 0.18 manganese;

no greater than 0.17 silicon;

no greater than 0.020 phosphorus;

no greater than 0.015 sulfur;

no greater than 1.05 iron; and

no greater than 0.020 boron.

6. The alloy of claim 1, comprising:

at least 20 cobalt

33.0 to 37.0 nickel;

19.0 to 21.0 chromium;

9.0 to 10.5 molybdenum;

less than 30 ppm nitrogen.

7. The alloy of claim 6, further comprising:

no greater than 0.025 carbon;

no greater than 0.15 manganese;

no greater than 0.15 silicon;

no greater than 0.015 phosphorus;

no greater than 0.010 sulfur;

no greater than 1.0 iron; and

no greater than 0.015 boron.

8. The alloy of claim 7, comprising less than 20 ppm nitrogen.

9. The alloy of claim 7, further comprising less than 0.7 weight percent titanium.

10. The alloy of claim 7, further comprising less than 0.03 weight percent titanium.

11. The alloy of any of claims 1 and 6, wherein the alloy is substantially free of titanium nitride and mixed metal carbonitride inclusions.

12. The alloy of claim 1, further comprising 0.05 to 0.15 weight percent aluminum.

13. The alloy of claim 1, further comprising 5 to 20 ppm calcium.

14. The alloy of claim 1, further comprising 5 to 50 ppm weight percent magnesium.

15. The alloy of claim 1, further comprising 5 to 50 ppm cerium.

16. The alloy of claim 1, wherein the alloy does not exhibit significant oxygen embrittlement at grain boundaries.

17. The alloy of claim 1, wherein the alloy is substantially free of titanium.

18. The alloy of claim 1, wherein the alloy is substantially free of nitrogen.

19. The alloy of claim 1, wherein the alloy has an endurance limit greater than 100 ksi.

20. The alloy of claim 1, wherein the alloy qualifies for use in surgical implant applications under ASTM standard specification F 562.

21. An alloy comprising, in weight percent based on total alloy weight:

at least 20 cobalt;

33.0 to 37.0 nickel;

19.0 to 21.0 chromium;

9.0 to 10.5 molybdenum;

no greater than 0.025 carbon;

no greater than 0.15 manganese;

no greater than 0.15 silicon;

no greater than 0.015 phosphorus;

no greater than 1.0 titanium;

no greater than 0.010 sulfur;

no greater than 1.0 iron; and

no greater than 0.015 boron.

wherein the alloy is substantially free of titanium nitride and mixed metal carbonitride inclusions.

22. The alloy of claim 21, comprising less than 30 ppm nitrogen.

23. The alloy of claim 21, comprising less than 20 ppm nitrogen.

24. The alloy of claim 21, comprising less than 0.7 weight percent titanium.

25. The alloy of claim 21, comprising less than 0.03 weight percent titanium.

26. The alloy of claim 21, further comprising 0.05 to 0.15 weight percent aluminum.

27. The alloy of claim 21, further comprising 5 to 20 ppm calcium.

28. The alloy of claim 21, further comprising 5 to 50 ppm weight percent magnesium.

29. The alloy of claim 21, further comprising 5 to 50 ppm cerium.

30. The alloy of claim 21, wherein the alloy does not exhibit significant oxygen embrittlement at grain boundaries.

31. The alloy of claim 21, wherein the alloy has an endurance limit greater than 100 ksi.

31. The alloy of claim 21, wherein the alloy qualifies for use in surgical implant applications under ASTM standard specification F 562.

32. An article of manufacture comprising the alloy of any of claims 1 through 31.

33. The article of manufacture of claim 32, wherein the article of manufacture is selected from a bar, a wire, a tube, a surgical implant device, a component for a surgical implant device, an implantable defibrillator, a component for an implantable defibrillator, an implantable pacemaker, a component for an implantable pacemaker, a pacing lead, and a cardiac stent.

34. The article of manufacture of claim 32, wherein the article of manufacture is one of a bar and a wire, and qualifies for use in surgical implant applications under ASTM standard specification F 562.

35. A method of making an alloy, the method comprising:

preparing a VAR ingot having a composition including

at least 20 weight percent cobalt,

33.0 to 37.0 weight percent nickel,

19.0 to 21.0 weight percent chromium, and

9.0 to 10.5 weight percent molybdenum; and

less than 30 ppm nitrogen.

36. The method of claim 35, wherein the ingot is substantially free of titanium nitride and mixed metal carbonitride inclusions.

37. The method of claim 35, wherein the ingot comprises less than 20 ppm nitrogen.

38. The method of claim 35, wherein the ingot comprises less than 0.7 weight percent titanium.

39. The method of claim 35, wherein the ingot comprises less than 0.03 weight percent titanium.

40. The method of claim 35, wherein the ingot further comprises 0.05 to 0.15 weight percent aluminum.

41. The method of claim 35, wherein the ingot further comprises 5 to 20 ppm calcium.

42. The method of claim 35, wherein the ingot further comprises 5 to 50 ppm weight percent magnesium.

43. The method of claim 35, wherein the ingot further comprises 5 to 50 ppm cerium.

44. The method of claim 35, wherein the ingot further includes

no greater than 0.025 carbon;

no greater than 0.15 manganese;

no greater than 0.15 silicon;

no greater than 0.015 phosphorus;

no greater than 0.010 sulfur;

no greater than 1.0 iron; and

no greater than 0.015 boron.

45. The method of claim 35, wherein the ingot is produced by a sequence including VIM.

46. The method of claim 35, further comprising:

processing the ingot into one of a bar, a wire, and a tube.

47. The method of claim 46, wherein the bar, wire, or tube has an endurance limit greater than 100 ksi.

48. The method of claim 35, further comprising:

processing the ingot into one of a bar and a wire, wherein the bar or wire qualifies for use in surgical implant applications under ASTM standard specification F 562.

49. The method of claim 48, wherein the bar or wire is further processed into one of a surgical implant device, a component for a surgical implant device, a component for an implantable defibrillator, a component for an implantable pacemaker, a pacing lead, and a cardiac stent.